

REMARKS

This is in response to the Office Action dated August 31, 2005. Claims 5-6 are pending and have not been amended herein.

Housekeeping Matters

Initially, it is noted that the Examiner has apparently forgotten to initial JP 9-17890 listed on the PTO 1449 accompanying the September 15, 2004 Office Action. It is respectfully requested that the Examiner provide the undersigned with another PTO-1449 where this reference has been initialed.

Also, it is respectfully requested that the Examiner formally acknowledge applicants' foreign priority claim, and the fact that the certified copy of the priority document was filed in the parent application.

General

For purposes of example only, and without limitation, certain example embodiments of this invention relate to a semiconductor memory device including at least one memory cell. Figs. 3-5 illustrate an example memory cell including a tunnel oxide film 2 (i.e., an insulator including at least some oxygen), a floating gate 3, a first insulating film 7 (e.g., ONO, or any other suitable insulator), a control gate 8, and an overlying second insulating film (10 and/or 11). A relevant aspect of certain example embodiments of this invention is shown in Figs. 5A-5D, and relates to the second insulating film (10 and/or 11) comprising an oxide formed over the tunnel oxide film 2. In particular, after the source/drain regions 4, 5 have been formed, isotropic etching may be used to remove part of the tunnel oxide film 2 under a sidewall of the floating gate 3 (e.g., pg. 17, lines 6-18; and pg. 21, lines 11-16). Due to this removal of the damaged part of the tunnel oxide film 2, there is less of a path for electrons to leak from the floating gate 3 to

the substrate 1 during operation of the finished product (e.g., pg. 21, lines 17-19). Thus, the side walls of the tunnel oxide film 2 are at least partially receded (laterally offset inwardly) from the side walls of the floating gate 3. In particular, the laterally outermost side walls of the tunnel oxide film 2 are at least partially receded from the side walls of the floating gate 3. After part of the tunnel oxide film 2 has been removed as shown in Fig. 5B, a second insulating film (10 and/or 11) comprising silicon oxide is formed over and contacting the sidewalls of the tunnel oxide film 2, the side walls of the floating gate 3, the side walls of the first insulating film 7, and the sidewalls of the control gate 8. This is advantageous for example in that substantially uniform oxidation occurs at the interface between the floating gate 3 and the surrounding insulating films; and thus substantially equal FN (Fowler-Nordheim) currents flow through the tunnel oxide film 2 during write operations (e.g., pg. 21, line 19 to pg. 22, line 2). As a result, variation in threshold voltage can be reduced, write time can be shortened, and/or cells affected by gate disturbance can be reduced (e.g., pg. 22, lines 2-11).

Art Rejection

Claims 5-6 stand rejected under 35 U.S.C. Section 102(b) as being allegedly anticipated by Deustcher (US 6,103,576). The Office Action relies on Figs. 9-13 of Deustcher. This Section 102(b) rejection is respectfully traversed for at least the following reasons.

Claim 5 requires that the side walls of the tunnel oxide film are at least partially receded from the side walls of the floating gate, so that the laterally outermost side walls of the tunnel oxide film are at least partially receded from the side walls of the floating gate. For example and without limitation, Fig. 5D of the instant application illustrates that the laterally outermost side walls of the tunnel oxide film 2 are receded from the side walls of the floating gate 3. Deustcher fails to disclose or suggest the above underlined feature of claim 5.

The Examiner relies on Fig. 12 of Deustcher for the alleged teaching of the laterally outermost side walls of the tunnel oxide film being at least partially receded from the side walls of the floating gate, and states that “fig. 12 *appears* to show such a limitation” (emphasis added). However, Fig. 12 of Deustcher does not illustrate any end or side wall of the tunnel oxide anywhere near the side wall of the gate, and cannot possibly illustrate this requirement of claim 5. The Examiner’s argument is based on speculation and improper hindsight. There is nothing in Deustcher that suggests that in Fig. 12 of Deustcher the laterally outermost side walls of the tunnel oxide film are at least partially receded from the side walls of the floating gate.

Furthermore, Fig. 9 of Deustcher also fails to disclose or suggest the aforesaid underlined feature of claim 5. Fig. 9 of Deustcher makes clear that the side wall of alleged tunnel oxide 42 cannot be at least partially receded from the side walls of gate 104. Deustcher is again entirely unrelated to the invention of claim 5 in at least this respect, and cannot anticipate the same.

Claim 6 requires that “the side walls of the tunnel oxide film are at least partially receded from the side walls of the floating gate, so that the laterally outermost side walls of the tunnel oxide film are at least partially receded from the side walls of the floating gate.” Again, Deustcher fails to disclose or suggest this feature of claim 6.

It is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

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Respectfully submitted,

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